ACCESSION #: 9909230035

NON-PUBLIC?: N

LICENSEE EVENT REPORT (LER)

FACILITY NAME: LaSalle County Station, Unit 2 PAGE: 1 OF 4

DOCKET NUMBER: 05000374

TITLE: Automatic Scram Due to Failure of Reactor Water Level

Control

EVENT DATE: 08/21/99 LER #: 99-002-00 REPORT DATE: 09/20/99

OTHER FACILITIES INVOLVED: DOCKET NO: 05000

OPERATING MODE: 1 POWER LEVEL: 070

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR SECTION:

50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:

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Extension 2929

COMPONENT FAILURE DESCRIPTION:

CAUSE: SYSTEM: COMPONENT: MANUFACTURER:

REPORTABLE EPIX:

SUPPLEMENTAL REPORT EXPECTED: NO

ABSTRACT:

On August 21, 1999, at 2251 hours, during a down power, Unit 2 feedwater flow and reactor water level began to oscillate due to a failure of the 2A Turbine Driven Reactor Feedwater Pump (TDRFP) hydraulic control system. Efforts by the reactor operator to restore level control were ineffective, and at 2255 hours the reactor automatically scrammed on low reactor water level.

The root causes of the scram were inadequate maintenance on the 2A TDRFP servo valve 2FW163AA, and the failure of the control room crew to take proper action in response to a reactor level transient. Corrective actions include: repairing the servo valve; reinforcing operator standards associated with command and control, communications, and pre-job briefs; and improving operator knowledge deficiencies through training.

The safety significance of the event was minimal. The plant responded as designed, and the Emergency Core Cooling Systems were not challenged.

PLANT AND SYSTEM IDENTIFICATION

General Electric - Boiling Water Reactor, 3323 Megawatts Thermal Rated

Core Power

Energy Industry Identification System (EIIS) codes are identified in

the text as [XX].

A. CONDITION PRIOR TO EVENT

Unit(s): 2 Event Date: 08/21/99 Event Time: 2255 Hours

Reactor Mode(s): 1 Power Level(s): 070

Mode(s) Name: Run

B. DESCRIPTION OF EVENT

On August 19, 1999, Unit 2 experienced a drop in indicated electrical

output. Troubleshooting indicated that the fault was a poor

connection at a main generator (TG)[TB] output potential transformer

fuse clip. To make the repairs it was decided to reduce reactor power

to less than 25 percent, in order to preclude a reactor scram in the

event that the repair work induced a turbine/generator trip.

Power reduction began at 2200 hours on August 21, 1999, in accordance

with LGP 3-1 "Power Changes". At 2251 hours, with reactor power reduced to approximately 70 percent, reactor water low and then high level alarms were received in the control room. The reactor operator diagnosed that the oscillating reactor water level was due to a failure of the 2A Turbine Driven Reactor Feedwater Pump (TDRFP)(FW)[Si] controls, and attempted to stabilize level by controlling feed flow with the 2A TDRFP controller in manual. The appropriate action would have been to take manual control of both feedwater pumps, as directed by procedure LOA-FW-201 "Reactor Level/Feedwater Pump Control Trouble." The reactor operator did not refer to this procedure. The reactor vessel high level alarm was an entry condition into LOA-FW-201, although the low level alarm was not. The reactor operator observed that manual changes in 2A TDRFP controller demand/position were slow in changing 2A TDRFP pump speed, and determined that the pump was not responding as expected. With the 2B TDRFP still in automatic control, the reactor operator secured the 2A TDRFP and manually started the Motor Driven Reactor Feedwater Pump (MDRFP). This action exacerbated the transient, and at 2255 hours the event was terminated by an automatic scram on low reactor water level. The operators were prepared to insert a manual scram prior to the automatic scram signal; however, the automatic scram was received at 16 inches reactor water level, instead of the expected Technical Specification setpoint of 12.5 inches.

During preparations to restart Unit 2, an Instrument Maintenance (IM) Technician was performing LIP-FW-612A, "Unit 2 TDRFP A Low Pressure EHC System Calibration." The "A" subloop of the 2A LPEHC system required extensive and repetitive calibration. When the IM was removing his test equipment leads, he noted a response from the control system when the diaphragm cover plate of servo valve 2FW163AA was touched. The cover plate was confirmed to be loose, the cap screws were tightened, and the calibration was performed again, this time without difficulty. The loose cover plate was determined to be the cause of the inconsistent performance of the 2A TDRFP.

This event is reportable under 10 CFR 50.73 (a)(2)(iv) as an event or condition that resulted in a manual or automatic actuation of any engineered safety feature (ESF), including the reactor protection system (RPS).

C. CAUSE OF EVENT

The direct cause of this event was a failure of the 2A TDRFP hydraulic control system. The root cause was inadequate maintenance performed on servo valve 2FW163AA during the last refueling outage. The work instructions did not specify torque values for the diaphragm cover cap screws, which were found to be very loose. This resulted in an inconsistent direction and magnitude response to controller demands.

Another cause of the scram was the failure of the control room crew to

take proper actions in response to the reactor level transient. An extensive human performance evaluation identified the root causes as inadequate command and control standards, failure to follow procedure, operator knowledge weaknesses, and weaknesses in the pre-job briefs that were conducted.

D. SAFETY ANALYSIS

The safety significance of this event was minimal. The event is bounded by accident analysis as described in the Updated Final Safety Analysis Report. The plant responded as expected to a low reactor water level signal, and the Emergency Core Cooling Systems were not challenged.

E. CORRECTIVE ACTIONS

Immediate Actions:

1. The diaphragm cover cap screws on the 2FW163AA servo valve were tightened, and the controller response was tested at various power levels from 65 to 95 percent. Satisfactory system performance was validated on August 29, 1999 during a rapid deep load drop to 70 percent and subsequent power ascension (complete).

2. The criteria for entry into operating abnormal procedure LOA-FW-101 (201) "Reactor Level/Feedwater Pump Control Trouble" was reinforced with reactor operators (complete).

Corrective Actions to Prevent Recurrence:

3. Appropriate simulator training in command and control for system abnormal operations (LOAs) will be developed and conducted (ATM# 15139-19).

4. Heightened Level of Awareness (HLA) and pre-job briefings will be improved to focus on the risk sensitive aspects of the evolution being reviewed (ATM# 15139-15).

5. Cap screw torque requirements for TDRFP hydraulic servo valves will be identified and added to the vendor manuals (ATM# 15139-22).

6. A torque check of cap screw tightness will be performed during future quarterly preventative maintenance on the TDRFP hydraulic controls (ATM# 15139-23).

F. PREVIOUS OCCURRENCES

LER 01-98-015 "Manual Reactor SCRAM following level control transient"

While performing level control testing for the 1A TDRFP, automatic level control was lost when the Nuclear Station Operator (NSO) attempted to place it in 3 element automatic control. At plus 50 inches increasing, the NSO inserted a manual SCRAM due to the feedwater transient.

The cause of the scram was attributed to a failure of the control card associated with the Bailey Water Level Control System. The corrective actions were focused on troubleshooting and repairing the control

card, and would not have prevented this event.

G. COMPONENT FAILURE DATA

Since no component failure occurred, this section is not applicable.

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